

# **IOWA HIGHWAY RESEARCH BOARD (IHRB)**

*Minutes of January 27, 2012*

## **Regular Board Members Present**

A. Abu-Hawash  
J. Berger  
V. Dumdei  
J.D. King  
R. Knoche  
J. Moellering

D. Schnoebelen  
E. Steffensmeier  
T. Wipf  
R. Younie  
K. Mayberry

## **Alternate Board Members Present**

T. Simodynes  
D. Miller

## **Members with No Representation**

J. May  
C. Schloz  
R. Kieffer  
W. Weiss

## **Secretary - M. Dunn**

## **Visitors**

Sandra Larson  
Vanessa Goetz  
Lori Pflughaupt  
Scott Schram  
Mike Nop  
Brian Keierleber  
Brent Phares  
Pavana Vennapusa  
David White  
Kelly Miller  
Lisa Rold

Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Iowa Department of Transportation  
Buchanan County  
Iowa State University/CCEE  
Iowa State University/CCEE  
Iowa State University/CCEE  
Iowa State University/CCEE  
FHWA Iowa Division

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Thursday, January 27, 2012. The meeting was called to order at 9:00 a.m. by Chairperson Ron Knoche with an initial number of 10 voting members/alternates at the table.

## **Agenda**

No changes were made to the Agenda.

**Motion to approve Minutes from the December 2011 meeting** by V. Dumdei. 2<sup>nd</sup> by D, Schnoebelen.  
Motion carried with 10 Aye, 0 Nay, 0 Abstaining.

## **BACKGROUND**

With the current state of bridge substructures throughout the United States, particularly the secondary road system, there exists a need for bridge repairs and replacements. Many Iowa counties, however, need alternative solutions that are relatively low cost with adequate long-term performance. Many of the deficient bridges exist on vital roadways that cannot afford to be out of service for long periods of time.

Steel sheet pile bridge abutment systems were identified as one possible alternative for bridge replacements because they allow for rapid construction and can serve the dual purpose of retaining backfill soils and as foundation bearing elements to support the abutment. Previously in the United States, steel sheet piling has been used for mainly retaining structures and temporary installations. In a few states, such as Alaska and New York, steel sheet pile abutment systems have been constructed.

A total of 14 different project sites were investigated in several different counties as potential sites for demonstration projects. Three sites located in Black Hawk, Boone, and Tama Counties were selected based on site conditions for demonstration projects. As of August 2010, three bridges have been constructed in the respective counties, each utilizing different alternative sheet pile abutments. Each bridge project was instrumented and data have been collected and analyzed from load tests. Data collection of long-term performance is still ongoing.

The purpose of this review is to summarize information pertaining to the application, design, availability, and methods for construction and monitoring of steel sheet pile bridge abutment systems.

## **OBJECTIVES**

- Investigate a design approach for sheet pile bridge abutments for short span, LVR bridges including calculation of lateral stresses from retained soil and bearing support for the superstructure.
- Formulate an instrumentation and monitoring plan to evaluate performance of sheet pile abutment systems including evaluation of lateral structural forces and bending stresses in the sheet pile sections.
- Produce a report and technology transfer materials that provide an understanding of the associated costs and construction effort as well as recommendations for use and potential limitations of sheet pile bridge abutment systems.

## **DISCUSSION**

Q: Do you evaluate scour as part of the selection criteria?

A: This is something that came up and we looked carefully at it and discovered that sheet pile lengths were right at the limit for scour. Some of the scour depths are pretty significant and caused some challenges.

Q: Was there any follow up monitoring?

A: One of the nice things about the time period we worked on the project was that we could go back months later and do a live load test months after completion.

C: (Wipf) Several counties in SW New York State using sheet pile and have been the past 20-25 years. They implemented the idea some time ago and liked and have been using it on short span. We have had some correspondence with NY and Ohio.

**Motion to Approve** by R. Younie. 2<sup>nd</sup> by A. Abu-Hawash.  
Motion carried with 10 Aye, 0 Nay, 0 Abstaining.

\*\*\*\*\*One member left the table\*\*\*\*\*

***FINAL REPORT TR-621, “Roadway Geosynthetic Reinforced Soil for Low Volume Bridge Abutments”***, David White, Iowa State University/InTrans (\$81,500)

#### BACKGROUND

Use of GRS bridge abutments can potentially be a cost-effective and structurally efficient alternative for supporting LVR bridge abutments. Recently, two LVR bridges were constructed in the State of Iowa as part of the TR-568 project where GRS fill material was used and retained with sheet pile abutments. As part of this research project, two more LVR bridges were constructed in the State of Iowa with RRFC bridges supported on shallow spread footing over GRS abutments/backfill. The FHWA has added GRS technology to their Every Day Counts (EDC) initiative to promote accelerated implementation of this technology by the states and local authorities, and recently produced two manuals that covers the background, design, construction, and performance aspects of GRS with integrated single span bridge systems (IBS).

#### OBJECTIVES

- Develop an instrumentation and monitoring plan to evaluate performance of newly constructed GRS bridge abutment systems.
- Develop a design approach and construction guidelines for GRS bridge abutment systems with shallow spread footings on LVR bridges.
- Document and evaluate the cost and construction aspects associated with construction of GRS bridge abutment systems from detailed field observations on project sites.
- Produce a research report and technology transfer materials that provide recommendations for use and potential limitations of GRS bridge abutment systems.

#### Discussion

Q: Based on the load test that indicated there was less load distribution than anticipated, will you be going back to improve connection between the railcars to achieve better load distribution?

A: We can go back and improve the connection. We have built about 21 of these bridges and have tied them together several different ways. In this instance, I believe that the bolt spacing was too far apart.

Q: The lateral stresses measured on these bridges were much lower than estimated during design. How will you use this information in future designs to make them more cost effective?

A: The biggest cost savings would be to not design any retaining wall structure as load bearing. If it is a fascia structure only, it will reduce the cost.

**Motion to Approve** by V. Dumdei. 2<sup>nd</sup> by K. Mayberry.  
Motion carried with 9 Aye, 0 Nay, 0 Abstaining.

\*\*\*\*\*Two members joined the table\*\*\*\*\*

***FINAL REPORT TR-609, “Roadway Examination of Curing Criteria for Cold In-Place Recycling Phase III”***, David Lee, University of Iowa (\$104,140)

## BACKGROUND

The current practice in Iowa simply controls the maximum moisture content in the cold in-place recycling (CIR) of 2.0 percent, whereas many CIR projects, struggling with unfavorable climate, have been overlaid successfully with higher amounts of moisture. The prior research was conducted to explore technically sound and more effective ways to identify minimum in-place CIR properties necessary to permit placement of the HMA overlay.

Moisture loss indices were developed based on the field measurements from one CIR-foam and one CIR-emulsion construction sites. To calibrate the moisture loss indices, six CIR construction sites that include two CIR-foam sites, two CIR-emulsion (CSS-1) sites and two CIR-emulsion (HFMS-2s) sites, were proposed to be monitored using embedded moisture and temperature sensors. However, due to the lack of available CIR-emulsion sites nearby, one CIR-HFMS-2S emulsion site and six CIR-foam sites were monitored.

The potential of using the stiffness measured by geo-gauge to supplement (or possibly replace) the moisture measurement by a nuclear gauge was explored in this study. A correlation between stiffness and moisture content was developed.

## OBJECTIVES

The main objectives of the study are to: 1) measure the moisture contents and temperature throughout a CIR layer from six CIR project sites, 2) calibrate the developed moisture loss indices using the field measurement from six CIR project sites, and 3) develop stiffness/density gain model to supplement (or possibly replace) the moisture criteria.

## BENEFITS

During the previous study, both moisture and temperature conditions were measured in the field by embedding the sensors in the CIR layer. Based upon the field measurements, moisture loss indices were developed as a function of initial moisture condition and cumulative pavement temperature per hour. However, it is necessary to calibrate the moisture loss indices so that they can be applied to various CIR construction projects in Iowa. The results of the research are presented as more accurate and rational moisture loss indices for various types of CIR construction. The moisture loss index will be a truly useful tool for all pavement engineers, which can help them accurately determine an optimum timing of an overlay without continually measuring moisture conditions in the field using a nuclear gauge. The moisture loss indices will rationalize the way the quality of CIR layer is inspected for the optimum timing of an HMA overlay and significantly enhance the long-term performance of CIR pavements. In addition, the stiffness of CIR layer measured by the Geo-gage can be used to supplement (or possibly replace) the moisture measurement during a curing period.

## \*DISCUSSION\*

Q: How satisfied were you with the moisture sensors used on this project?

A: The sensors we used were from Pullman Washington and they produced pretty consistent results.

Q: How close were the moisture tests in proximity to each other within each project?

A: A few meters

Q: Was there wide variation in individual readings going down the road?

A: No. There was only one group installation on each project and they were close in proximity to each other.

Q: Was the lack of emulsion sites included in the study a result of the DOT moving to foam primarily?

A: Yes. There are more emulsion projects on county level, but mostly foam on the state level.

Q: What kind of testing device was used?

A: It was a Humboldt Geogauge. The cost is \$6-7,000. It is a vibration based device.

**Motion to Approve** by J. Berger. 2<sup>nd</sup> by E. Steffensmeier.

Motion carried with 11 Aye, 0 Nay, 0 Abstaining.

***REQUEST FOR MATCHING FUNDS FOR PROPOSALS to Minnesota Local Roads Research Board,*** David White, Iowa State University/InTrans

- a) Development of Cost-Effective Timber Bridge Repair Techniques for Minnesota (\$299,582)  
Objectives: 1) identifying repair strategies that will be effective for timber bridge population, 2) studying the cost-effectiveness and economics of repair strategies and extension of service life, 3) preparation of a timber bridge repair manual, 4) the conduct of outreach, and 5) the production of an archival final report.
- b) Development and Integration of Advanced Timber Bridge Inspection Techniques for NBIS (\$199,786)  
Objectives: This project will help bridge inspectors and engineers develop and implement advanced inspection techniques for timber bridges and serve as a model for State DOTs and their partners. Various nondestructive tools and methods for conducting state-of-the-art inspections are to be highlighted in a guidance manual and are to be demonstrated in training seminars. These efforts should help to identify those structures needing repair or replacement and to safely extend the service lives of timber bridges.

**\*DISCUSSION\***

C: There was general interest in the need for both projects.

C: MN probably would not go with pooled fund idea. This takes too much time (6-8 mo).

C: Total funding is about \$500,000 between the 2 proposals. The IHRB could agree to commit to a set % of the project total.

Q: What does the FY funding look like?

A: It is tight. We could break it into 2 parts and pay some this FY and some the next FY.

C: If MN is only interested in one, we should press for both projects.

Brent Phares: I'm confident MN is for sure going to do the inspection project.

Mark will work through the FY break down in contribution and see if it can be spread across a couple of FYs.

Motion to Approve funding for 30% of the total cost; conditional on both projects moving forward at the same time by J. King. 2<sup>nd</sup> by R. Younie.

Motion carried with 10 aye, 0 nay, 1 abstaining (Wipf).

**\*\*\*\*\*Two members left the table\*\*\*\*\***

## ***SECOND ROUND RFP REVIEW AND DISCUSSION FY 11-12***

### **a. IHRB-11-06, Evaluation of Epoxy Patching Materials for Concrete Pavement**

Comments:

\*look at patching in general, not just epoxy

\*A presentation was given at the Better Concrete Conference regarding partial depth patches. That information might provide some background to the RFP prior to solicitation.

### **b. IHRB-11-07, Methods for Removing Concrete Decks from Beam/Girder Bridges**

\*Nebraska is getting ready to do something similar, according to Ahmad Abu-Hawash. He suggested a collaborative effort with Nebraska.

\*Q: How often do we use deck replacement as this project is researching methods only used for re-decking?

\*A: We do a fair amount of re-decking of bridges. We cannot eliminate re-decking; we need it as an option.

### **c. IHRB-11-08, Update the Guidance Information Available for New County Engineers**

\*C: A "Frequently Asked Questions" section would be useful

\*C: This should be an item for discussion at County Engineer meeting in February.

### **d. IHRB-11-09, Development of Bridge Maintenance, Inspection, and Rating Manuals for Iowa**

\*No comments on the draft as written

## ***NEW BUSINESS***

County Engineer Focus Group Update:

Next meeting is February 22, 2012. The meeting will be held in Ames at the Gateway Hotel and is being funded by State Research funds. Lunch is included. The meeting is available to all 99 counties and there is no registration fee.

\*Identify research on low volume roads.

\*Need funding for counties, this is an everyday concern.

\*Reaching out to Minnesota, hoping someone will attend the upcoming County Engineer meeting in February.

## ***ADJOURN***

Motion to Adjourn by R. Younie. 2<sup>nd</sup> by T. Wipf.

Motion carried with 9 aye, 0 nay, 0 abstaining.

**The next meeting of the Iowa Highway Research Board will be held Friday, February 24, 2012, in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin promptly at 9 a.m.**

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**Mark J. Dunn, IHRB Secretary**